

Memorandum

To: JOSEPH PRATT - MS #5
Office of Structure Foundations
Division of Structural Foundations

Date: July 11, 2000

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Southbound 5 Truck Connector
Bridge No. 57-1028F

From: DEPARTMENT OF TRANSPORTATION
ENGINEERING SERVICE CENTER
Division of Materials Engineering and Testing Services – MS #5
Office of Testing and Technology Services

Subject: **Southbound 5 Truck Connector**

We have completed our corrosion review of the Southbound 5 Truck Connector project outlined in a May 8, 2000 memorandum sent to Doug Parks of the Corrosion Technology Branch. Our review is based on corrosion test results of soil samples, summarized information from the Log of test borings, and Caltrans Bridge Design Specifications 8.22 (May 2000 draft).

Project Description

The site is part of the Route 5/56 Interchange improvements for the San Diego/Del Mar Area. The proposed Southbound 5 Truck Connector will connect southbound Route 5 truck traffic to the existing Route 56/5 Separation (Br. No. 57-0989F). The bridge abutment 12 will be supported by plumb, 900 mm (3 ft) diameter, Cast-in-Drilled-Hole (CIDH) Piles. The bent supports will be supported by plumb, 3 m (10 ft) diameter, Cast-in-Drilled-Hole (CIDH) Piles. It is the understanding of the Corrosion Technology Branch that temporary steel casings 16mm thick (5/8 in) will be used to avoid problems associated with caving of the holes and filling with groundwater due to aquifer conditions. The casings shall be removed for greater skin friction of the pile against the soil.

Corrosion Review

Caltrans defines a corrosive area as an area where the soil and/or water contains more than 500 ppm of chlorides, more than 2000 ppm of sulfates, has a minimum resistivity of less than 1000 ohm-cm, or a pH of 5.5 or less.

Eleven soil samples were taken at the Southbound 5 Truck Connector site of the native material. The samples were tested for pH, minimum resistivity, sulfate concentration, and chloride concentration in accordance with CTM 643, CTM 417, and, CTM422. The pH ranged from 5.2 to 8.6. The minimum resistivity ranged from 470 ohm-cm to 1700 ohm-cm. The sulfate concentration ranged from 25 ppm to 1620 ppm. Finally, the chloride concentration ranged from less than 25 ppm to 1200 ppm.

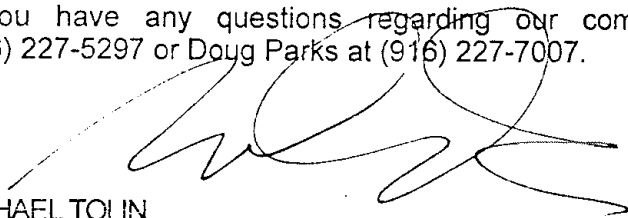
The embankment fill and/or artificial fill materials are corrosive based on low pH levels, low minimum resistivity levels, and a high chloride concentration. The pH values are below 5.5 (as low as 5.2). The minimum resistivity values are below 1000 ohm-cm (as low as 470 ohm-cm). The chloride concentration is above 500 ppm (up to 1200 ppm).

Corrosion Recommendations

In order to maintain a 75-year design life for the structure, we recommend the following corrosion mitigation measures:

- The minimum concrete cover requirements for chloride environments are addressed in Table 8.22.1 of the BDS (May 2000 draft). Given chloride concentrations at the site are between 500 ppm and 5000 ppm, a minimum concrete cover of 75 mm (3 inches) should be used for reinforcing steel for CIDH piles, pile caps, walls, and footings.
- The minimum requirements for protection of reinforced and unreinforced concrete against acid and sulfate exposure shall be in accordance with Table 8.22.2 of the BDS (May 2000 draft). For CIDH piles, footings, pile caps, and walls, the concrete should contain a minimum cementitious material content of 400 kg per cubic meter. Cementitious material shall consist of 75% by mass Type II modified, or Type V portland cement and 25% by mass mineral admixture conforming to ASTM C618 Type F or N (flyash or natural pozzolans). Also, the water-to-cementitious material ratio shall be a maximum of 0.40.

If you have any questions regarding our comments, please contact Michael Tolin at (916) 227-5297 or Doug Parks at (916) 227-7007.



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Reviewed By:



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